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COMMODORE 64 GAME CARTRIDGE

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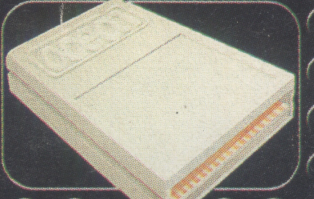

ACE BOOKLET

THE CARTRIDGE FAMILY

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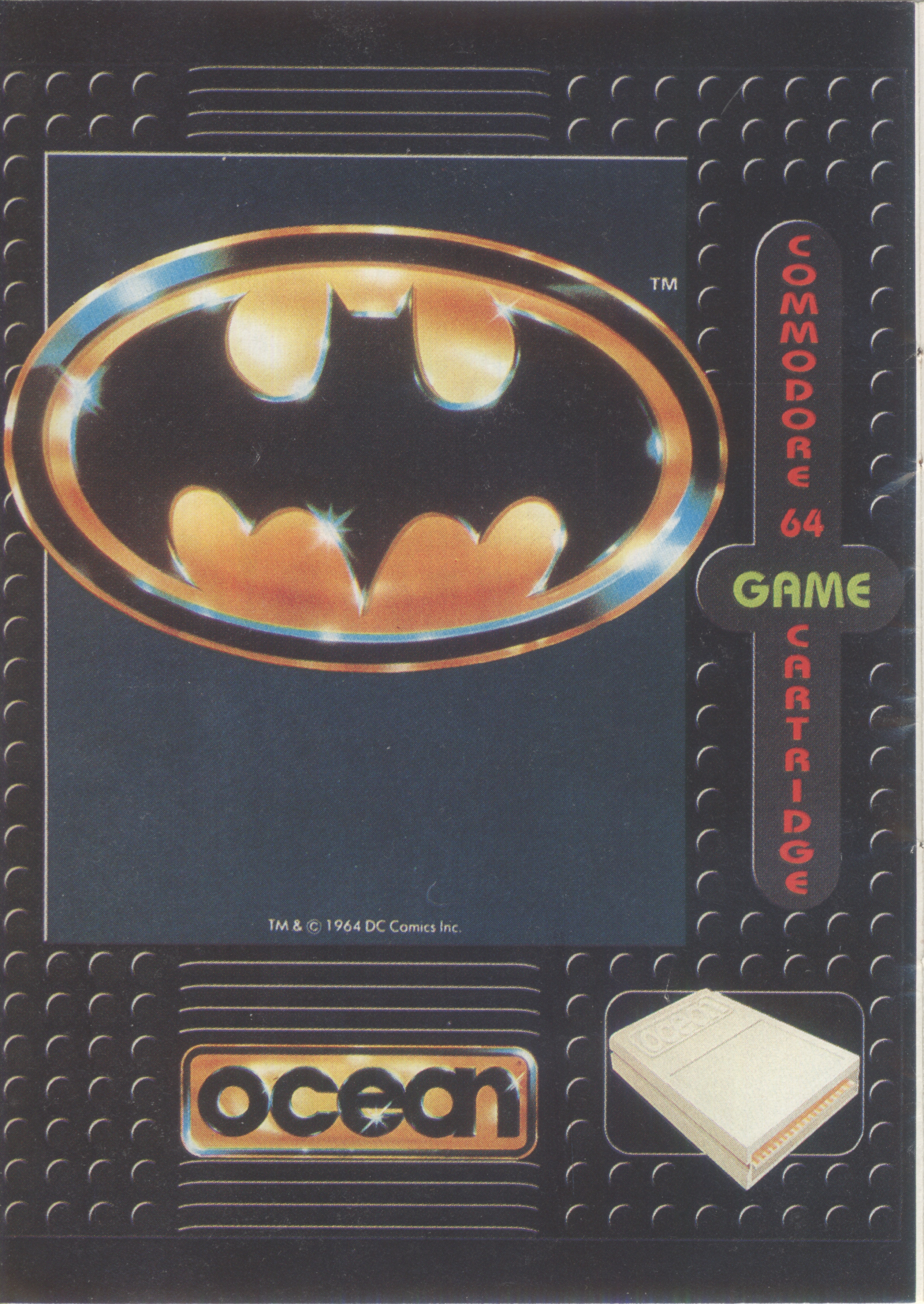
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Ocean supremo David Ward explains why his company are investing more and more in cartridge technology.

6 GETTING INTO ROM

Software development boss Gary Bracey explains the different games philosophy behind cartridges – a philosophy that could soon change the face of 16-bit gaming as well.

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Living proof that cart technology can deliver: four of Ocean's latest C64 carts – hotter than anything you'll get on tape or disk.

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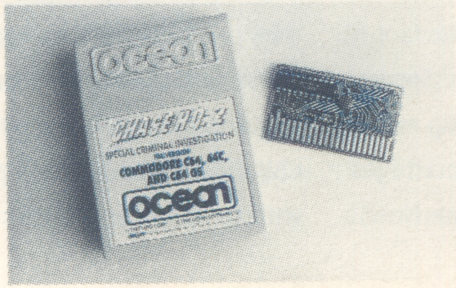
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COMMODORE C64, 64C, AND C64 GS
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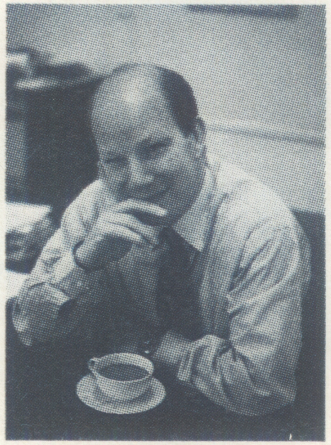
Ocean's C64 cartridges feature custom-designed PCB's and work on all C64's. They also offer gameplay enhancements over cassette and disk versions

WHY PLAY CARTS?



Ocean Supremo David Ward: 'We can do more with cartridge than we can with either tape or disk.' And although he's giving nothing away, we reckon there are Amiga carts on the way as well

Cartridges have been around as long as tape or disk and machines like the C64 have had cartridge capability from the beginning, but why is it only now that cartridge software is becoming fashionable – and does it deserbe to be?

'Cartridges,' says Ocean's David Ward, 'used to be a rip off. Who in their right mind was going to go into a shop and spend maybe £30 to get a cartridge version of a game that they could get on tape or disk for less than half the price?' The fact is, in the days of *International Soccer* (an early C64 cartridge), chip memory was so expensive that cartridges simply weren't a real option. Now, things are changing fast and a company like Ocean can afford to design and manufacture 2 megabit game carts (that's a healthy 256K) and still get them onto the market at under £20.

Great, but so what? Why should we get into plastic after all? You can fit more data on a disk for less money. Why carts?

In the console market, we tend to take cartridges for granted, but in fact there's a significant chance that they can bring major changes to game design on computers as well. It's already happening with the C64...soon it could be happening with your Amiga. Here's why...

Let's look at data loading technology first, starting off with the worst case scenario – the C64 C2N data cassette recorder. 'Let's face it,' says David, 'that machine was meant for loading in 8K wine lists written in BASIC. If you want to load in a whole 64K, you've got two choices – you either wait 40 minutes or you increase the baud rate. If you adopt the latter approach, the whole process becomes something of a random affair.

Nowadays, we don't just want to load 64K – we're designing multi-level games where each level takes up 64K. So you need multiple loads, and the whole process becomes more and more fraught. The fact is, the use of the machine has expanded beyond its original intent. The data loading process simply can't handle modern games. For the C64, disk drives are one solution, but in this country less than 10% of owners have them.'

'Cartridge software didn't take off originally for the C64 because of the cost – and also because of the learning curve. You have to learn a whole new set of tricks producing for ROM, including – for the Commodore machine – designing your own PCB to mount the chips on, finding out the best ways of processing the data transfer, and so on. However, we're now at a point where we can produce 2 and 4 megabit cartridges for maybe an extra £5. And that extra £5 gets you a lot more than instant loading...'

Er...like what? Enter Gary Bracey, Ocean's software development supremo, with the answer...

'First, we have practically instant access to data held on cartridge – and remember that that data is compressed so you've actually got a lot more than 256K of information there. This means that games can be more sophisticated than their counterparts on tape or disk – especially tape.'

'We can now really go overboard with presentation, whether it's a better loading screen, more detailed backgrounds, bigger sprites, or more sound. We can have levels that use more than the available RAM of the machine because we can instantly overwrite data that's no longer required with new data from the cartridge. So, for example, we can have an end-of-level sprite that's practically as big as the entire screen. That would be impossible with tape and very awkward even with disk, but cartridge makes it easy.'

Ocean software development boss Gary Bracey, investing heavily in cart technology

'In some cases,' adds David Ward, 'it actually makes the difference between being able to produce a specific game and having to forget it. *Shadow of the Beast* on the C64, for example, would be quite impossible on any format other than cartridge.'

GETTING ONTO ROM

Putting games on cartridge, explains Gary, 'means a totally different games design philosophy. For example, we have to know from the very beginning whether a title is destined for cartridge or cassette. Not only is the game design going to be affected, but the production schedule is different too. In theory, with a tape we can have a master in the morning and be duplicating the next day. With ROMs we first get the master, then blow the ROMs, then test them – all of which can take up to three months. We're quicker than most people in this respect – we spent a lot of time and money specially developing and designing our own boards for the C64.'

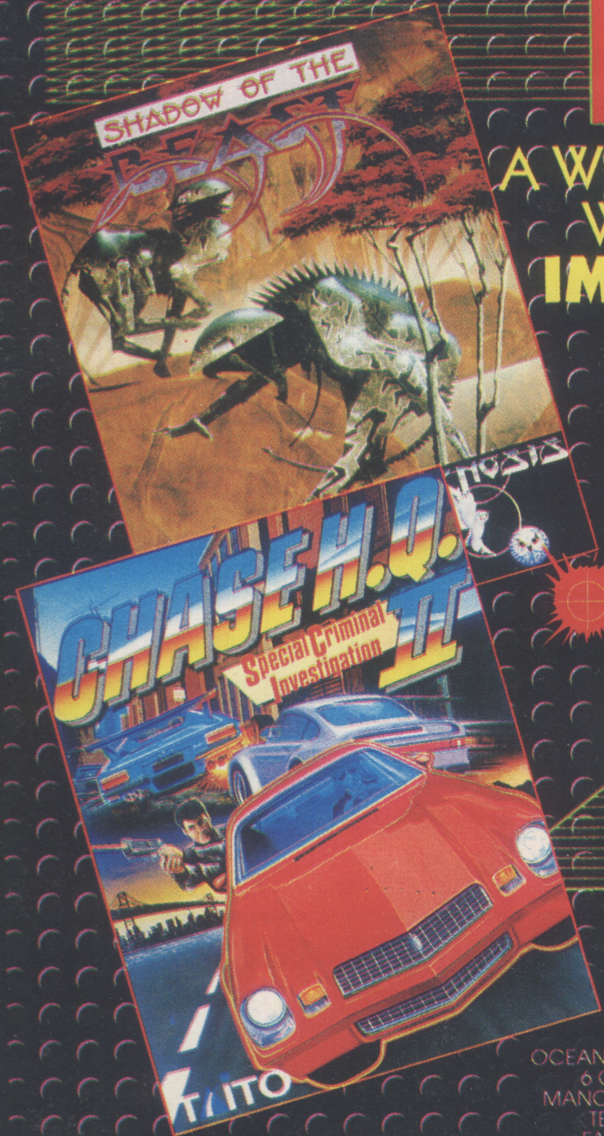
It soon becomes obvious, talking to the lads at Ocean, that there's far more afoot in the cartridge market than the C64. In theory, many computers offer expansion ports that can take cartridges and one in particular – the Amiga – is a prime candidate for cartridge software. The difficulty here, however, is that cartridge games would need to hold at least 512K to compete with some of the disk based products. some game designs, however, would benefit enormously from the instant access even with a lower cartridge capacity.

'The real advances,' says Gary, 'are going to come when we can combine cartridges with CD. You will then be able to use the CD for massive data storage, but still benefit from instant access to a limited amount of data on the cartridge. This could be a very potent combination.'

Putting those carts through their paces – the game testing room at Ocean

Smart cards are also a possibility, though in a sense they can simply be considered as slimline carts. One useful development here, however, is the transceiver-equipped card that can be remotely programmed and can also remotely program other devices. One day you'll be walking into the arcade and your wrist-watch will be setting up every unused machine in sight with your own personal high-score and playing preferences (visitors to the ACE Living Room of the Future will have already seen this device at last year's CES Show at Earls Court).

CARTRIDGE POWER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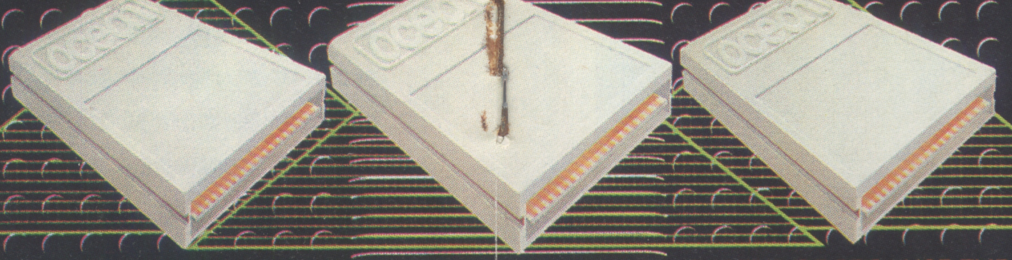
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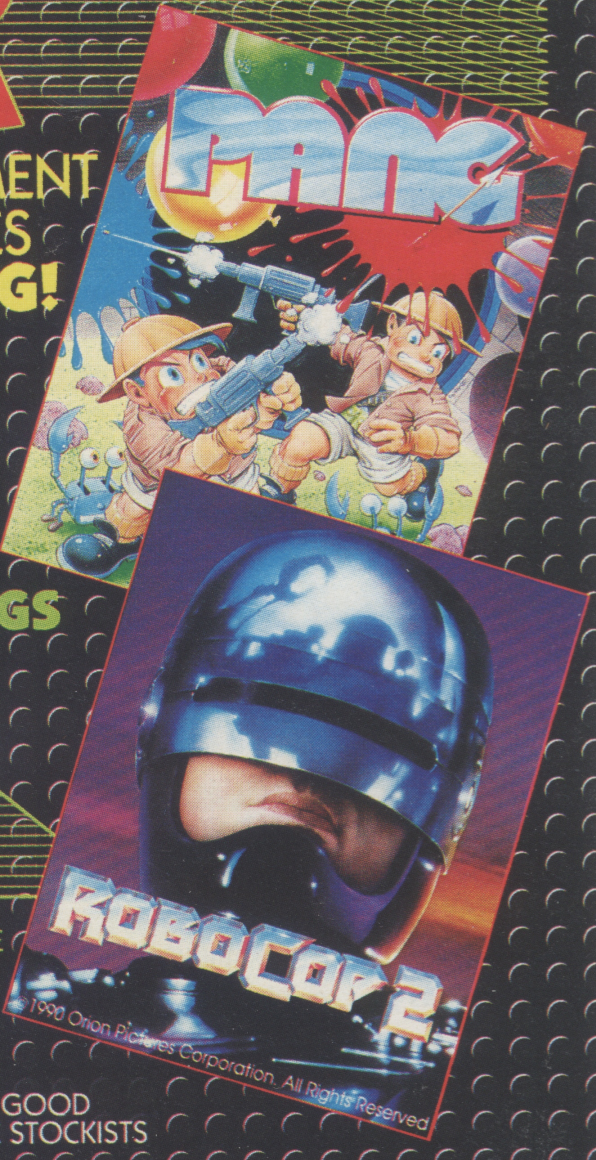
PANG
ROBOCOP 2
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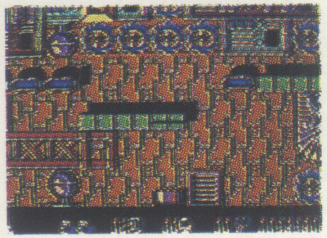
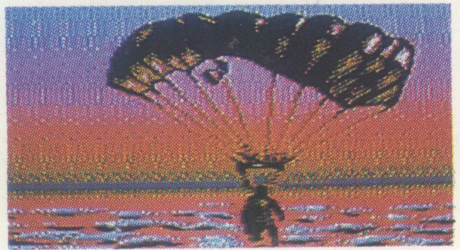
The baddies are skedaddling down the motorway in a variety of getaway vehicles as yours truly savours enhanced speed, better speech, extra weapons, and differing missions. Other features include a group of bikers who come to help you as well as variable weather patterns that affect your vehicle's performance. You start in gai Paree and end up in the Sahara, collecting mucho bonus weaponry en route.



Different screens in Robocop II would, on tape, have required tedious multiloads



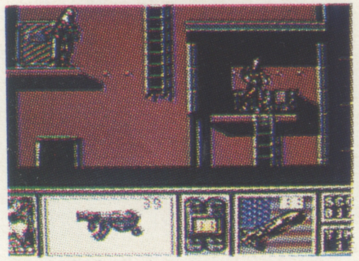
Using cartridges enables the programmers to include more presentation screens and graphic details, as here in SCI

NAVY S.E.A.L.S.

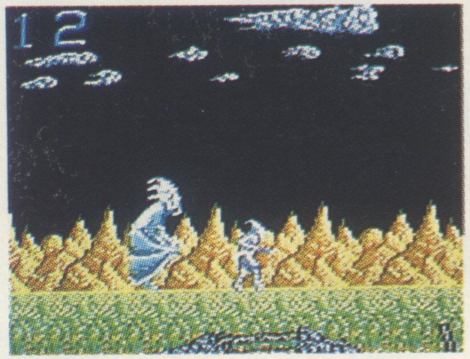
A slight touch of RPG influence here as your squad of five crack S.E.A.L.S. beat the stuffing out of a gang of terrorists in the Gulf following the shooting-down of a US chopper and the kidnapping of botht he pilot and co-pilot. First you have to rescue the pilot (apparently the co-pilot cops it anyway), which involves wasting large numbers of enemy troops, destroying their communication systems, and depleting their weaponry. Then it's time to sally forth and discover the missile store which the bad guys are planning to use in mass destruction of US civilian life. Multi-directional scrolling combines with some unusual (and, for 8-bit, impressive) animation to bring you a game packed with power-ups, platform action, exploration, and general ass-kicking.

ROBOCOP 2

Drug lords are overrunning the City of Detroit, which is now in danger of being sold off in its entirety to the corrupt OCP, the company that gave us the original Robocop. Now they're producing a newer, deadlier version of inhuman law enforcement – Robocop 2 – that's threatening to reduce Detroit to rubble. As the original metal Murphy you must overcome the drug baron baddie, rescue hostages, and finally wipe out your replacement in a game that spans 8 levels, linked by shooting gallery and puzzle sections. You get 4 high-tech futuristic weapons, numerous power-ups, bigger sprites, and a whole host of unholy hazards. Just what you wanted, eh?



Navy S.E.A.L.S. uses the cart option to store numerous animation frames that would otherwise have swallowed up essential RAM

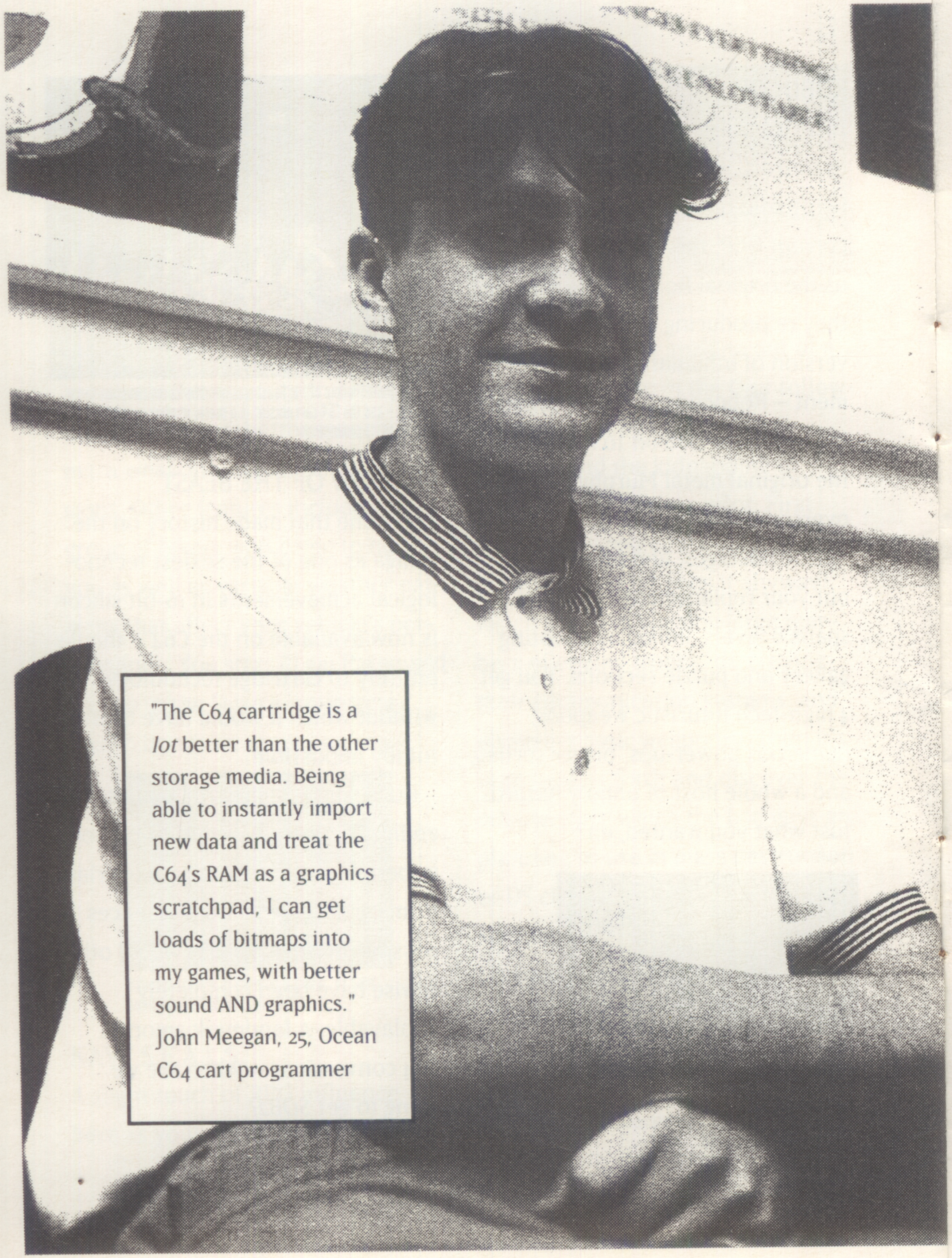


The original Shadow of the Beast was notable for its complex, large sprites – and the C64 cart version is a pretty impressive attempt to live up to its predecessor

SHADOW OF THE BEAST

The game that made history on the Amiga as one of the sexiest technological achievements in 16-bit silicon is now available on the C64 – thanks entirely to cartridge technology, without which it would have been totally impossible.

Huge sprites, massive hostiles, and endless action adventure await you as benefit from instant data overlay from cartridge, making sequences possible on the C64 that would otherwise have been completely unplayable. A landmark amongst C64 conversions – when are we going to get *SOB2*?



> "The C64 cartridge is a *lot* better than the other storage media. Being able to instantly import new data and treat the C64's RAM as a graphics scratchpad, I can get loads of bitmaps into my games, with better sound AND graphics."
> John Meegan, 25, Ocean C64 cart programmer

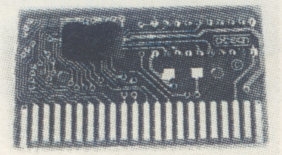
MORE CART TOPPERS

Ocean are really putting their backs into cartridge development on other formats as well...here's a quick line-up...

SUPER FAMICOM

'It's terrific!' beams Gary, 'and best of all there are some ports on the back which drop subtle hints about future expansion.'

Gary's keeping tight lipped about what that future expansion could be, but ACE is already in the know about a planned CD-ROM unit for the reasonably near future. There's no doubt a CD-ROM on the Super Famicom would make it an awesome device – and bring us right into Gary's ideal world (see earlier) where we can combine CD and cartridge technology on one machine.



Ocean designed their own PCB for the C64, making development more efficient

AMSTRAD GX4000

'A great machine', enthuses Gary. 'The specs are very neat indeed and far superior to the old CPC. It's also nice to program for. I have a lot of respect for the way Amstrad asked us to come and check out the specs before going into production. We gave our suggestions for enhancements and implementations – and they actually got done. No-one's ever done that before.' Current Ocean GX4000 titles include *Robocop 2*, *Navy Seals*, *Pang*, *SCI*, and, of course, *Burning Rubber* (which came with the machine).

NINTENDO ENTERTAINMENT SYSTEM

While other British software companies still struggle to get titles onto the Nintendo's umpteen million units, Ocean have been developing for the system for over two years. 'We've done very well,' claims Gary, '*Platoon*, for example, was licensed to Sunsoft who did the Nintendo version and got our name into that market in the States. Currently we've got *Robocop 2*, *The Untouchables*, *The Dark Man*, and some BIG movie licenses coming out in the near future...'

The NES is quite an old system now – over 8 years, believe it or not – but it was very much ahead of its time when first launched and still holds its own well against other 8-bit systems. One problem, however, is that the cartridge designs are therefore a bit primitive. In comparison with the C64 cartridge system, the NES cart needs three discrete chips – a memory chip for program data, a character ROM for the graphics, and a memory controller chip. Combine this with a large plastic casing and you have a cart that's a mite more pricey to manufacture. Different chip configurations can drive the game retail price from around $30 up to as much as $80 in the States. Suddenly those £19.99 C64 carts seem even better value.

GAMEBOY

Ocean have got a whole development team working on the Gameboy. Robocop is coming out in the States and they're developing two original titles for release over here, but the company weren't giving anything away about these just yet.

However, it seems likely that the new Gameboy titles will be offering some kind of multiplayer facility using the link cable. 'The Gameboy demands that you change some of your ideas about game design,' said Gary, 'The titles have got to be 'pick up and play', and because of the small monochrome screen they've also got to be simplistic.'

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